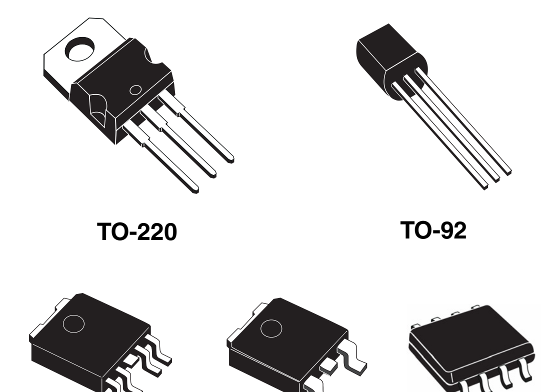
L4931ABxx
L4931Cxx

Very low drop voltage regulators with inhibit

Features

- Very low dropout voltage (0.4 V)
- Very low quiescent current
- (Typ. 50 μA in off mode, 600 μA in on mode)
- Output current up to 250 mA
- Logic-controlled electronic shutdown
- Output voltages of 2.7; 3.3; 3.5; 5; 8; 12 V
- Automotive Grade product: 2.7 V, 3.3 V, 3.5 V V_{OUT} only in SO-8 package
- Internal current and thermal limit
- Only 2.2 μF for stability
- Available in ± 1 % (AB) or 2 % (C) selection at 25 °C
- Supply voltage rejection: 70 dB typ. for 5 V version
- Temperature range: -40 to 125 °C



Description

The L4931ABxx L4931Cxx are very Low Drop regulators available in TO-220, SO-8, DPAK, PPAK and TO-92 packages and in a wide range of output voltages.

The very low drop voltage (0.4 V) and the very low quiescent current make them particularly suitable for low noise, low power applications and specially in battery powered systems.

A TTL compatible shutdown logic control function is available in PPAK and SO-8 packages.

This means that when the device is used as a local regulator, it is possible to put a part of the board in standby, decreasing the total power consumption. It requires only a 2.2 μF capacitor for stability allowing space and cost saving.

The L4931 is available as Automotive Grade in SO-8 package only, for the options of output voltages whose commercial Part Numbers are shown in the *Table 19 on page 34* (order codes). These devices are qualified according to the specification AEC-Q100 of the Automotive market, in the temperature range -40 °C to 125 °C, and the statistical tests PAT, SYL, SBL are performed.

Table 1. Device summary

Part numbers			
L4931ABXX27	L4931CXX33	L4931ABXX50	L4931CXX80
L4931CXX27	L4931ABXX35	L4931CXX50	L4931ABXX120
L4931ABXX33	L4931CXX35	L4931ABXX80	L4931CXX120

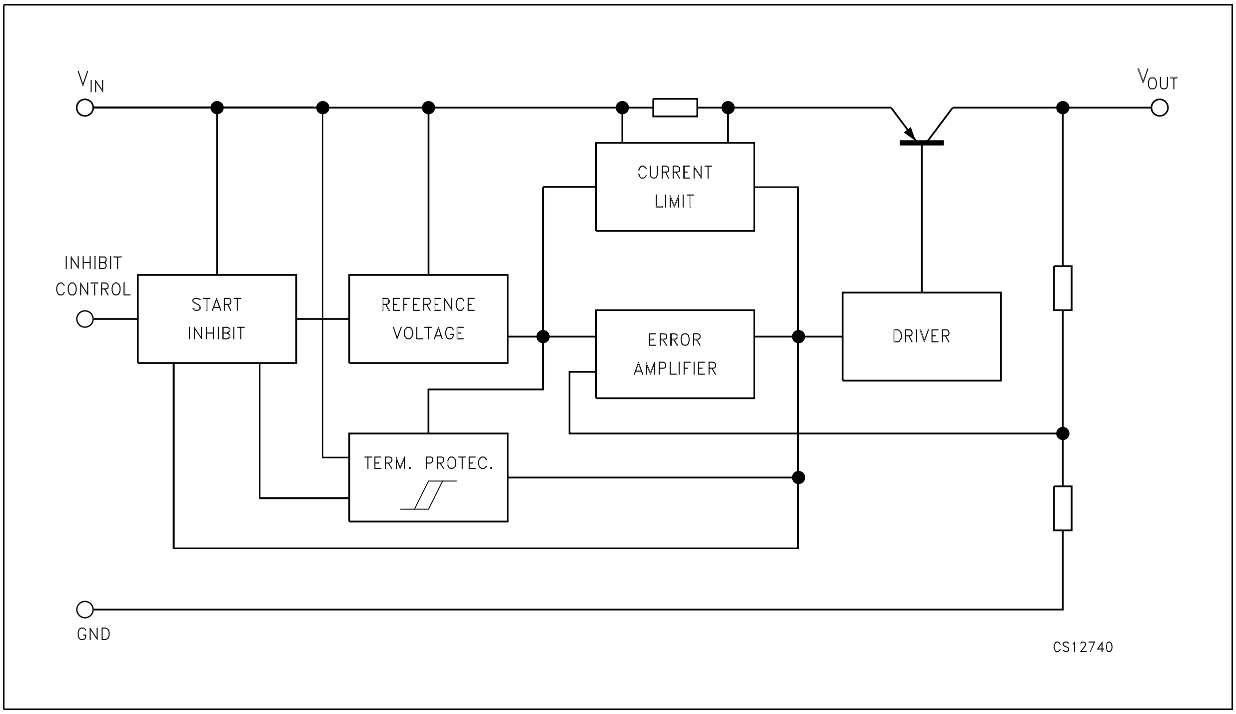
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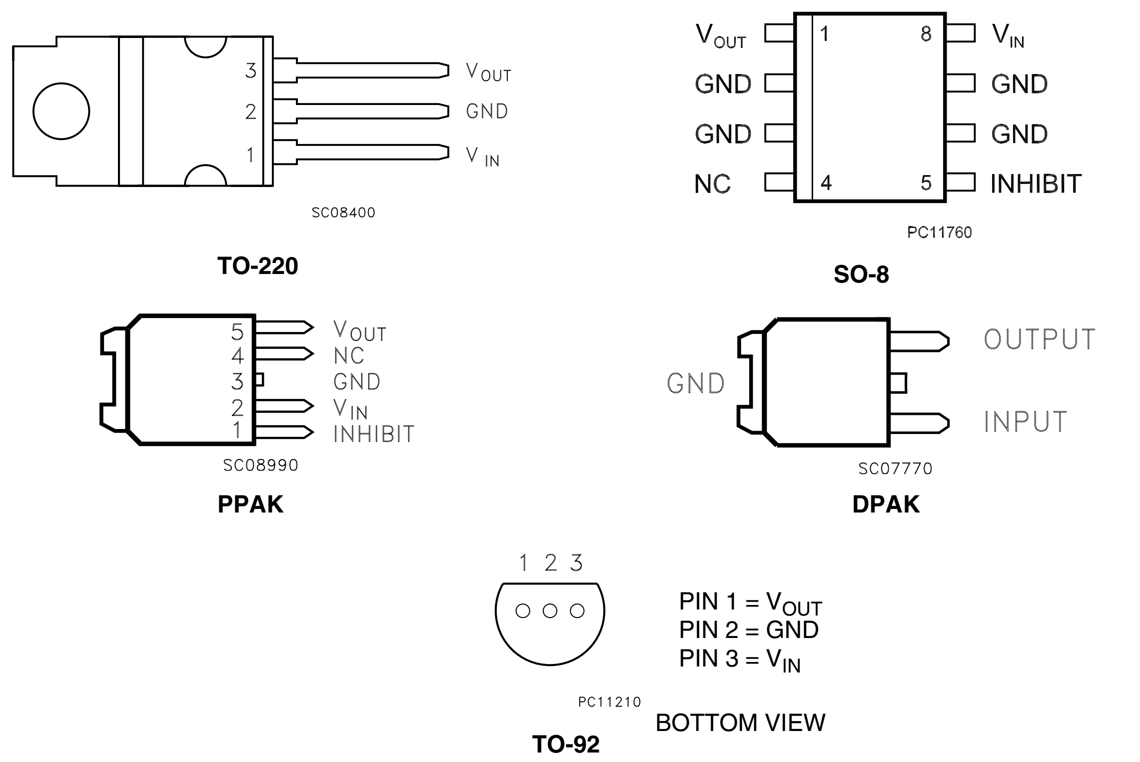
1 Diagram

Figure 1. Schematic diagram



2 Pin configuration

Figure 2. Pin connections (top view)



3 Maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_I	DC Input voltage	20	V
I_O	Output current	Internally limited	mA
P_D	Power dissipation	Internally limited	mW
T_{STG}	Storage temperature range	-40 to 150	°C
T_{OP}	Operating junction temperature range	-40 to 125	°C

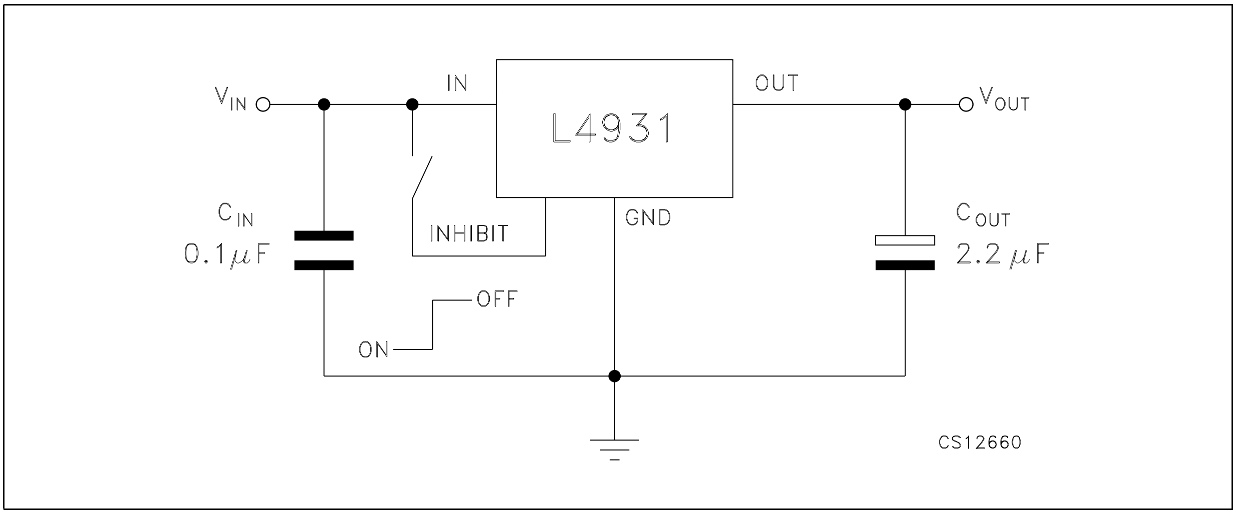
Note: Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied

Table 3. Thermal data

Symbol	Parameter	TO-220	SO-8	DPAK	PPAK	TO-92	Unit
R_{thJC}	Thermal resistance junction-case	3	20	8	8		°C/W
R_{thJA}	Thermal resistance junction-ambient	50	55	100	100	200	°C/W

4 Application circuit

Figure 3. Test circuit



5 Electrical characteristics

Table 4. Electrical characteristics of L4931ABxx27 (refer to the test circuits, T_A = 25 °C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 4.7 V		2.673	2.7	2.727	V
		I_O = 5 mA, V_I = 4.7 V, T_A=-25 to 85°C		2.646		2.754	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit				300		mA
ΔV_O	Line regulation	V_I = 3.4 to 20 V, I_O = 0.5 mA			3	15	mV
ΔV_O	Load regulation (1)	V_I = 3.6 V, I_O = 0.5 to 250 mA			3	15	mV
I_d	Quiescent current ON MODE	V_I = 3.6 to 20 V, I_O = 0 mA			0.6	1	mA
		V_I = 3.6 to 20 V, I_O = 250 mA			4	6	
	OFF MODE	V_I = 6 V			50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA V_I = 4.6 ± 1 V	f = 120 Hz		74		dB
			f = 1 kHz		71		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		µV
V_d	Dropout voltage (1)	I_O = 250 mA			0.4	0.6	V
		I_O = 250 mA, T_A= -40 to 125°C				0.8	V
V_{IL}	Control input logic low	T_A = -40 to 125°C				0.8	V
V_{IH}	Control Input Logic High	T_A = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA		2	10		µF

1. For SO-8 package the maximum limit of load regulation and dropout is increased by 20 mV.

Table 5. Electrical characteristics of L4931Cxx27 (refer to the test circuits, T_A = 25 °C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 4.7 V		2.646	2.7	2.754	V
		I_O = 5 mA, V_I = 4.7 V, T_A=-25 to 85°C		2.592		2.808	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit				300		mA
ΔV_O	Line regulation	V_I = 3.4 to 20 V, I_O = 0.5 mA			3	18	mV
ΔV_O	Load regulation (1)	V_I = 3.6 V, I_O = 0.5 to 250 mA			3	18	mV
I_d	Quiescent current ON MODE	V_I = 3.6 to 20 V, I_O = 0 mA			0.6	1	mA
		V_I = 3.6 to 20 V, I_O = 250 mA			4	6	
	OFF MODE	V_I = 6 V			50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA, V_I = 4.6 ± 1 V	f = 120 Hz		74		dB
			f = 1 kHz		71		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		µV
V_d	Dropout voltage (1)	I_O = 250 mA			0.4	0.6	V
		I_O = 250 mA, T_A= -40 to 125°C				0.8	V
V_{IL}	Control input logic low	T_A = -40 to 125°C				0.8	V
V_{IH}	Control Input Logic High	T_A = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA		2	10		µF

1. For SO-8 package the maximum limit of load regulation and dropout is increased by 20 mV.

Table 6. Electrical characteristics of L4931Cxx27-TRY (Automotive Grade) (refer to the test circuits, T_A = -40 to 12 5°C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 4.7 V, T_A = 25°C		2.646	2.7	2.754	V
		I_O = 5 mA, V_I = 4.7 V		2.592		2.808	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit	T_A = 25°C			300		mA
ΔV_O	Line regulation	V_I = 3.4 to 20 V, I_O = 0.5 mA				20	mV
ΔV_O	Load regulation	V_I = 3.6 V, I_O = 0.5 to 250 mA				38	mV
I_d	Quiescent current ON MODE	V_I = 3.6 to 20 V, I_O = 0 mA				1	mA
		V_I = 3.6 to 20 V, I_O = 250 mA				6	
	OFF MODE	V_I = 6 V				100	µA
SVR	Supply voltage rejection	I_O = 5 mA V_I = 4.6 ± 1 V T_A = 25°C	f = 120 Hz		74		dB
			f = 1 kHz		71		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz, T_A = 25°C			50		µV
V_d	Dropout voltage	I_O = 250 mA, T_A = 25°C			0.4	0.6	V
		I_O = 250 mA				0.82	V
V_{IL}	Control input logic low					0.82	V
V_{IH}	Control Input Logic High			2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V, T_A = 25°C			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA, T_A = 25°C		2	10		µF

Table 7. Electrical characteristics of L4931ABxx33 (refer to the test circuits, T_A = 25 °C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 5.3 V		3.267	3.3	3.333	V
		I_O = 5 mA, V_I = 5.3 V, T_A=-25 to 85°C		3.234		3.366	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit				300		mA
ΔV_O	Line regulation	V_I = 4 to 20 V, I_O = 0.5 mA			3	15	mV
ΔV_O	Load regulation (1)	V_I = 4.2 V, I_O = 0.5 to 250 mA			3	15	mV
I_d	Quiescent current ON MODE	V_I = 4.2 to 20 V, I_O = 0 mA			0.6	1	mA
		V_I = 4.2 to 20 V, I_O = 250 mA			4	6	
	OFF MODE	V_I = 6 V			50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA V_I = 5.2 ± 1 V	f = 120 Hz		73		dB
			f = 1 kHz		70		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		µV
V_d	Dropout voltage (1)	I_O = 250 mA			0.4	0.6	V
		I_O = 250 mA, T_A= -40 to 125°C				0.8	V
V_{IL}	Control input logic low	T_A = -40 to 125°C				0.8	V
V_{IH}	Control Input Logic High	T_A = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA		2	10		µF

1. For SO-8 package the maximum limit of load regulation and dropout is increased by 20 mV.

Table 8. Electrical characteristics of L4931Cxx33 (refer to the test circuits, T_A = 25 °C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 5.3 V		3.234	3.3	3.366	V
		I_O = 5 mA, V_I = 5.3 V, T_A=-25 to 85°C		3.168		3.432	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit				300		mA
ΔV_O	Line regulation	V_I = 4.1 to 20 V, I_O = 0.5 mA			3	18	mV
ΔV_O	Load regulation (1)	V_I = 4.3 V, I_O = 0.5 to 250 mA			3	18	mV
I_d	Quiescent current ON MODE	V_I = 4.3 to 20 V, I_O = 0 mA			0.6	1	mA
		V_I = 4.3 to 20 V, I_O = 250 mA			4	6	
	OFF MODE	V_I = 6 V			50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA V_I = 5.3 ± 1 V	f = 120 Hz		73		dB
			f = 1 kHz		70		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		µV
V_d	Dropout voltage (1)	I_O = 250 mA			0.4	0.6	V
		I_O = 250 mA, T_A= -40 to 125°C				0.8	V
V_{IL}	Control input logic low	T_A = -40 to 125°C				0.8	V
V_{IH}	Control Input Logic High	T_A = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA		2	10		µF

1. For SO-8 package the maximum limit of load regulation and dropout is increased by 20 mV.

Table 9. Electrical characteristics of L4931Cxx33-TRY (Automotive Grade) (refer to the test circuits, T_A = -40 to 125 °C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 5.3 V, T_A = 25°C		3.234	3.3	3.366	V
		I_O = 5 mA, V_I = 5.3 V		3.168		3.432	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit	T_A = 25°C			300		mA
ΔV_O	Line regulation	V_I = 4.1 to 20 V, I_O = 0.5 mA				20	mV
ΔV_O	Load regulation	V_I = 4.3 V, I_O = 0.5 to 250 mA				38	mV
I_d	Quiescent current ON MODE	V_I = 4.3 to 20 V, I_O = 0 mA				1	mA
		V_I = 4.3 to 20 V, I_O = 250 mA				6	
	OFF MODE	V_I = 6 V				100	µA
SVR	Supply voltage rejection	I_O = 5 mA V_I = 5.3 ± 1 V T_A = 25°C	f = 120 Hz		73		dB
			f = 1 kHz		70		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz, T_A = 25°C			50		µV
V_d	Dropout voltage	I_O = 250 mA, T_A = 25°C			0.4	0.6	V
		I_O = 250 mA				0.82	V
V_{IL}	Control input logic low					0.82	V
V_{IH}	Control Input Logic High			2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V, T_A = 25°C			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA, T_A = 25°C		2	10		µF

Table 10. Electrical characteristics of L4931ABxx35 (refer to the test circuits, T_A = 25 °C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 5.5 V		3.465	3.5	3.535	V
		I_O = 5 mA, V_I = 5.5 V, T_A=-25 to 85°C		3.43		3.57	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit				300		mA
ΔV_O	Line regulation	V_I = 4.2 to 20 V, I_O = 0.5 mA			3	15	mV
ΔV_O	Load regulation (1)	V_I = 4.4 V, I_O = 0.5 to 250 mA			3	15	mV
I_d	Quiescent current ON MODE	V_I = 4.4 to 20 V, I_O = 0 mA			0.6	1	mA
		V_I = 4.4 to 20 V, I_O = 250 mA			4	6	
	OFF MODE	V_I = 6 V			50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA V_I = 5.4 ± 1 V	f = 120 Hz		73		dB
			f = 1 kHz		70		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		µV
V_d	Dropout voltage (1)	I_O = 250 mA			0.4	0.6	V
		I_O = 250 mA, T_A= -40 to 125°C				0.8	V
V_{IL}	Control input logic low	T_A = -40 to 125°C				0.8	V
V_{IH}	Control Input Logic High	T_A = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA		2	10		µF

1. For SO-8 package the maximum limit of load regulation and dropout is increased by 20 mV.

Table 11. Electrical characteristics of L4931ABxx35-TRY (Automotive Grade) (refer to the test circuits, T_A = -40 to 125 °C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 5.5 V, T_A = 25°C		3.465	3.5	3.535	V
		I_O = 5 mA, V_I = 5.5 V		3.43		3.57	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit	T_A = 25°C			300		mA
ΔV_O	Line regulation	V_I = 4.2 to 20 V, I_O = 0.5 mA				17	mV
ΔV_O	Load regulation	V_I = 4.4 V, I_O = 0.5 to 250 mA				35	mV
I_d	Quiescent current ON MODE	V_I = 4.4 to 20 V, I_O = 0 mA				1	mA
		V_I = 4.4 to 20 V, I_O = 250 mA				6	
	OFF MODE	V_I = 6 V				100	µA
SVR	Supply voltage rejection	I_O = 5 mA V_I = 5.4 ± 1 V T_A = 25°C	f = 120 Hz		73		dB
			f = 1 kHz		70		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz, T_A = 25°C			50		µV
V_d	Dropout voltage	I_O = 250 mA, T_A = 25°C			0.4	0.6	V
		I_O = 250 mA				0.82	V
V_{IL}	Control input logic low					0.82	V
V_{IH}	Control Input Logic High			2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V, T_A = 25°C			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA, T_A = 25°C		2	10		µF

Table 12. Electrical characteristics of L4931Cxx35 (refer to the test circuits, T_A = 25 °C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 5.5 V		3.43	3.5	3.57	V
		I_O = 5 mA, V_I = 5.5 V, T_A=-25 to 85°C		3.36		3.64	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit				300		mA
ΔV_O	Line regulation	V_I = 4.3 to 20 V, I_O = 0.5 mA			3	18	mV
ΔV_O	Load regulation (1)	V_I = 4.5 V, I_O = 0.5 to 250 mA			3	18	mV
I_d	Quiescent current ON MODE	V_I = 4.5 to 20 V, I_O = 0 mA			0.6	1	mA
		V_I = 4.5 to 20 V, I_O = 250 mA			4	6	
	OFF MODE	V_I = 6 V			50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA V_I = 5.5 ± 1 V	f = 120 Hz		73		dB
			f = 1 kHz		70		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		µV
V_d	Dropout voltage (1)	I_O = 250 mA			0.4	0.6	V
		I_O = 250 mA, T_A= -40 to 125°C				0.8	V
V_{IL}	Control input logic low	T_A= -40 to 125°C				0.8	V
V_{IH}	Control Input Logic High	T_A= -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA		2	10		µF

1. For SO-8 package the maximum limit of load regulation and dropout is increased by 20 mV.

Table 13. Electrical characteristics of L4931ABxx50 (refer to the test circuits, T_A = 25 °C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 7 V		4.95	5	5.05	V
		I_O = 5 mA, V_I = 7 V, T_A=-25 to 85°C		4.9		5.1	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit				300		mA
ΔV_O	Line regulation	V_I = 5.8 to 20 V, I_O = 0.5 mA			3.5	17.5	mV
ΔV_O	Load regulation (1)	V_I = 6 V, I_O = 0.5 to 250 mA			3	15	mV
I_d	Quiescent current ON MODE	V_I = 6 to 20 V, I_O = 0 mA			0.6	1	mA
		V_I = 6 to 20 V, I_O = 250 mA			4	6	
	OFF MODE	V_I = 6 V			50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA V_I = 7 ± 1 V	f = 120 Hz		70		dB
			f = 1 kHz		67		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		µV
V_d	Dropout voltage (1)	I_O = 250 mA			0.4	0.6	V
		I_O = 250 mA, T_A= -40 to 125°C				0.8	V
V_{IL}	Control input logic low	T_A = -40 to 125°C				0.8	V
V_{IH}	Control Input Logic High	T_A = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA		2	10		µF

1. For SO-8 package the maximum limit of load regulation and dropout is increased by 20 mV.

Table 14. Electrical characteristics of L4931Cxx50 (refer to the test circuits, T_A = 25 °C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 7 V		4.9	5	5.1	V
		I_O = 5 mA, V_I = 7 V, T_A=-25 to 85°C		4.8		5.2	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit				300		mA
ΔV_O	Line regulation	V_I = 5.8 to 20 V, I_O = 0.5 mA			3.5	17.5	mV
ΔV_O	Load regulation (1)	V_I = 6 V, I_O = 0.5 to 250 mA			3	15	mV
I_d	Quiescent current ON MODE	V_I = 6 to 20 V, I_O = 0 mA			0.6	1	mA
		V_I = 6 to 20 V, I_O = 250 mA			4	6	
	OFF MODE	V_I = 6 V			50	100	µA
SVR	Supply voltage rejection	I_O = 5 mA V_I = 7 ± 1 V	f = 120 Hz		70		dB
			f = 1 kHz		67		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		µV
V_d	Dropout voltage (1)	I_O = 250 mA			0.4	0.6	V
		I_O = 250 mA, T_A= -40 to 125°C				0.8	V
V_{IL}	Control input logic low	T_A = -40 to 125°C				0.8	V
V_{IH}	Control Input Logic High	T_A = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA		2	10		µF

1. For SO-8 package the maximum limit of load regulation and dropout is increased by 20 mV.

Table 15. Electrical characteristics of L4931ABxx80 (refer to the test circuits, T_A = 25 °C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 10 V		7.92	8	8.08	V
		I_O = 5 mA, V_I = 10 V, T_A=-25 to 85°C		7.84		8.16	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit				300		mA
ΔV_O	Line regulation	V_I = 8.8 to 20 V, I_O = 0.5 mA			4	20	mV
ΔV_O	Load regulation (1)	V_I = 9 V, I_O = 0.5 to 250 mA			3	15	mV
I_d	Quiescent current ON MODE	V_I = 9 to 20 V, I_O = 0 mA			0.8	1.6	mA
		V_I = 9 to 20 V, I_O = 250 mA			4.5	7	
	OFF MODE	V_I = 6 V			70	140	µA
SVR	Supply voltage rejection	I_O = 5 mA V_I = 10 ± 1 V	f = 120 Hz		67		dB
			f = 1 kHz		64		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		µV
V_d	Dropout voltage (1)	I_O = 250 mA			0.4	0.6	V
		I_O = 250 mA, T_A= -40 to 125°C				0.8	V
V_{IL}	Control input logic low	T_A = -40 to 125°C				0.8	V
V_{IH}	Control Input Logic High	T_A = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA		2	10		µF

1. For SO-8 package the maximum limit of load regulation and dropout is increased by 20 mV.

Table 16. Electrical characteristics of L4931Cxx80 (refer to the test circuits, T_A = 25 °C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 10 V		7.84	8	8.16	V
		I_O = 5 mA, V_I = 10 V, T_A=-25 to 85°C		7.68		8.32	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit				300		mA
ΔV_O	Line regulation	V_I = 8.9 to 20 V, I_O = 0.5 mA			4	24	mV
ΔV_O	Load regulation (1)	V_I = 9.1 V, I_O = 0.5 to 250 mA			3	18	mV
I_d	Quiescent current ON MODE	V_I = 9.1 to 20 V, I_O = 0 mA			0.8	1.6	mA
		V_I = 9.1 to 20 V, I_O = 250 mA			4.5	7	
	OFF MODE	V_I = 6 V			70	140	µA
SVR	Supply voltage rejection	I_O = 5 mA, V_I = 10.1 ± 1 V	f = 120 Hz		67		dB
			f = 1 kHz		64		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		µV
V_d	Dropout voltage (1)	I_O = 250 mA			0.4	0.6	V
		I_O = 250 mA, T_A= -40 to 125°C				0.8	V
V_{IL}	Control input logic low	T_A = -40 to 125°C				0.8	V
V_{IH}	Control Input Logic High	T_A = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA		2	10		µF

1. For SO-8 package the maximum limit of load regulation and dropout is increased by 20 mV.

Table 17. Electrical characteristics of L4931ABxx120 (refer to the test circuits, T_A = 25 °C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 14 V		11.88	12	12.12	V
		I_O = 5 mA, V_I = 14 V, T_A=-25 to 85°C		11.76		12.24	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit				300		mA
ΔV_O	Line regulation	V_I = 12.8 to 20 V, I_O = 0.5 mA			4	20	mV
ΔV_O	Load regulation (1)	V_I = 13 V, I_O = 0.5 to 250 mA			3	15	mV
I_d	Quiescent current ON MODE	V_I = 13 to 20 V, I_O = 0 mA			0.8	1.6	mA
		V_I = 13 to 20 V, I_O = 250 mA			4.5	7	
	OFF MODE	V_I = 6 V			90	180	µA
SVR	Supply voltage rejection	I_O = 5 mA V_I = 14 ± 1 V	f = 120 Hz		64		dB
			f = 1 kHz		61		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		µV
V_d	Dropout voltage (1)	I_O = 250 mA			0.4	0.6	V
		I_O = 250 mA, T_A= -40 to 125°C				0.8	V
V_{IL}	Control input logic low	T_A = -40 to 125°C				0.8	V
V_{IH}	Control Input Logic High	T_A = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA		2	10		µF

1. For SO-8 package the maximum limit of load regulation and dropout is increased by 20 mV.

Table 18. Electrical characteristics of L4931Cxx120 (refer to the test circuits, T_A = 25 °C, C_I = 0.1 µF, C_O = 2.2 µF unless otherwise specified).

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_O	Output voltage	I_O = 5 mA, V_I = 14 V		11.76	12	12.24	V
		I_O = 5 mA, V_I = 14 V, T_A=-25 to 85°C		11.52		12.48	
V_I	Operating input voltage	I_O = 250 mA				20	V
I_{out}	Output current limit				300		mA
ΔV_O	Line regulation	V_I = 12.9 to 20 V, I_O = 0.5 mA			4	24	mV
ΔV_O	Load regulation (1)	V_I = 13.1 V, I_O = 0.5 to 250 mA			3	18	mV
I_d	Quiescent current ON MODE	V_I = 13.1 to 20 V, I_O = 0 mA			0.8	1.6	mA
		V_I = 13.1 to 20 V, I_O = 250 mA			4.5	7	
	OFF MODE	V_I = 6 V			90	180	µA
SVR	Supply voltage rejection	I_O = 5 mA V_I = 14.1 ± 1 V	f = 120 Hz		64		dB
			f = 1 kHz		61		
			f = 10 kHz		55		
eN	Output noise voltage	B = 10 Hz to 100 kHz			50		µV
V_d	Dropout voltage (1)	I_O = 250 mA			0.4	0.6	V
		I_O = 250 mA, T_A= -40 to 125°C				0.8	V
V_{IL}	Control input logic low	T_A = -40 to 125°C				0.8	V
V_{IH}	Control Input Logic High	T_A = -40 to 125°C		2			V
I_I	Control input current	V_I = 6 V, V_C = 6 V			10		µA
C_O	Output bypass capacitance	ESR = 0.1 to 10 Ω, I_O = 0 to 250 mA		2	10		µF

1. For SO-8 package the maximum limit of load regulation and dropout is increased by 20 mV.

6 Typical application

Figure 4. Line regulation vs temperature

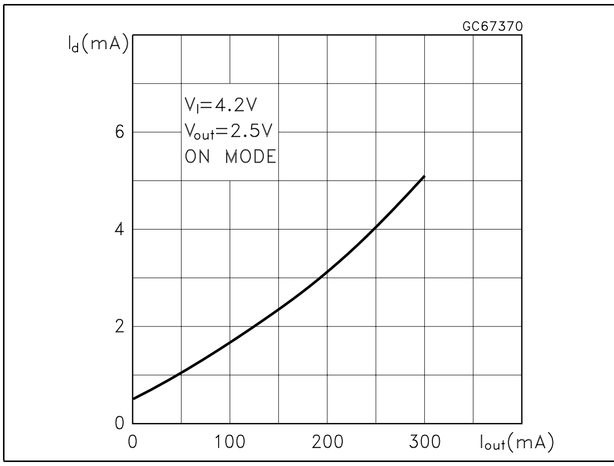


Figure 5. Dropout voltage vs temperature

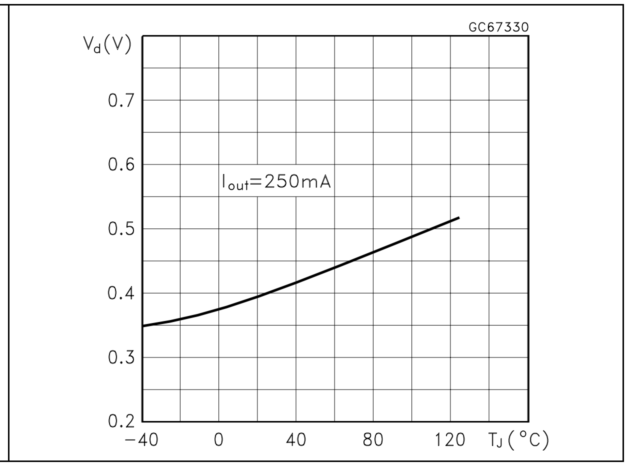


Figure 6. Supply current vs input voltage

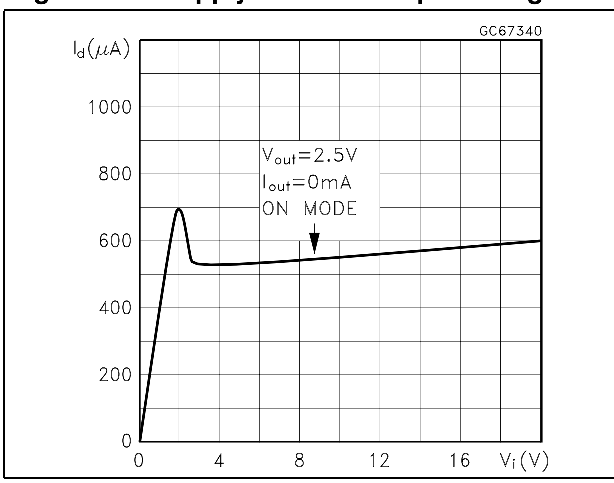


Figure 7. Supply current vs temperature

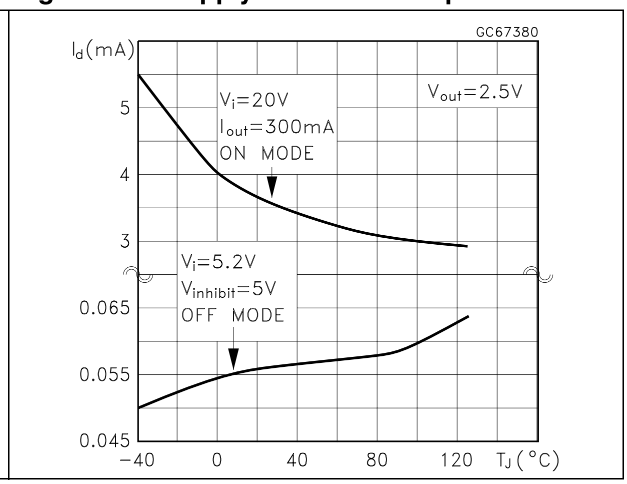


Figure 8. Short circuit current vs dropout voltage

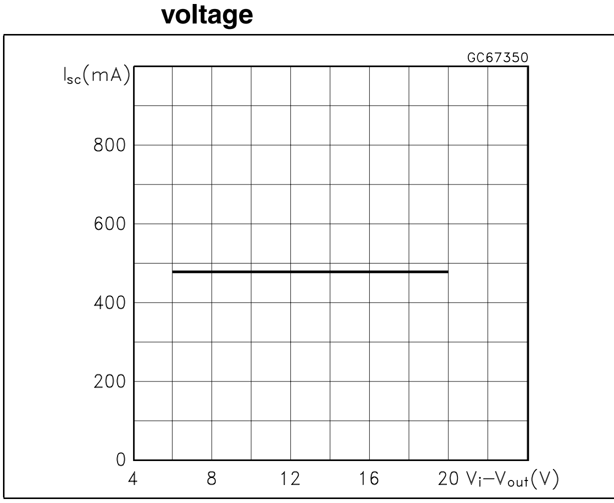
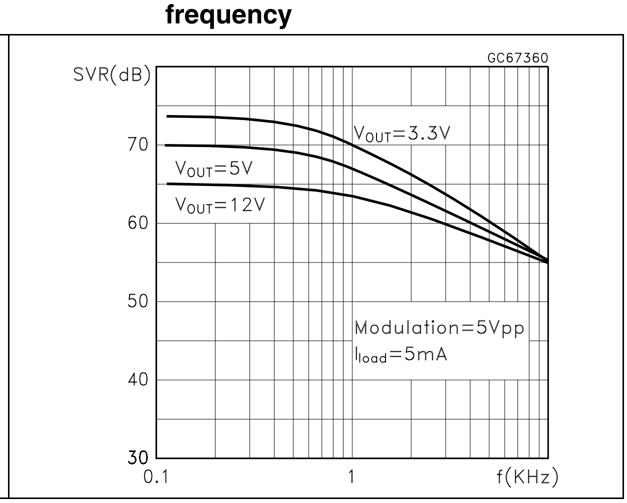


Figure 9. SVR vs input voltage signal frequency

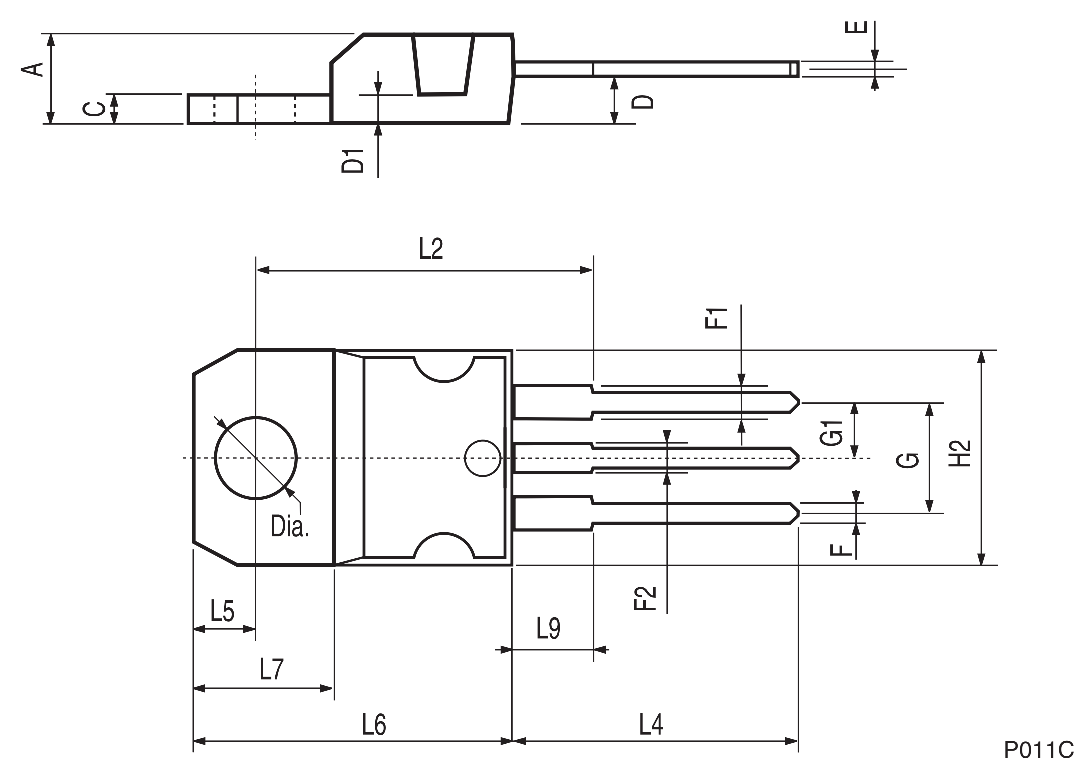


7 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

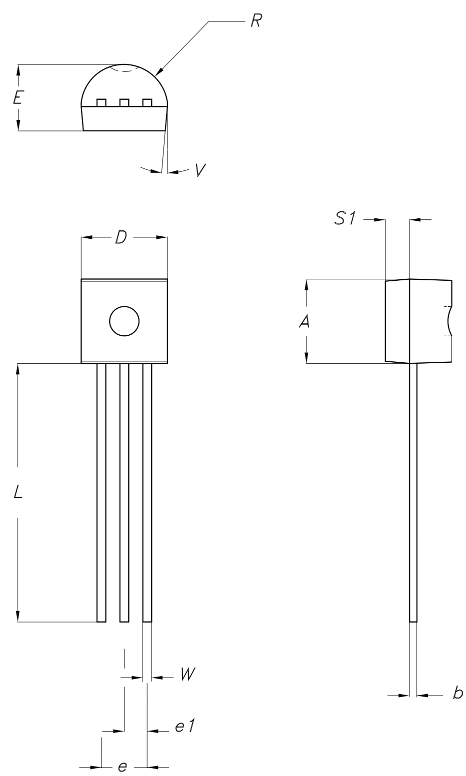
TO-220 mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



TO-92 mechanical data

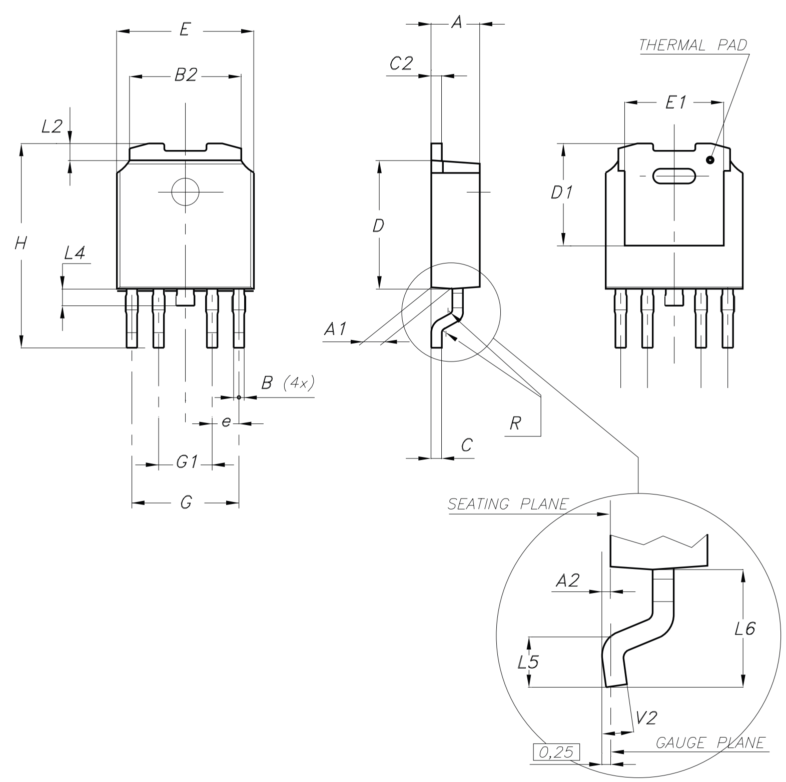
Dim.	mm.			mils.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.32		4.95	170.1		194.9
b	0.36		0.51	14.2		20.1
D	4.45		4.95	175.2		194.9
E	3.30		3.94	129.9		155.1
e	2.41		2.67	94.9		105.1
e1	1.14		1.40	44.9		55.1
L	12.7		15.49	500.0		609.8
R	2.16		2.41	85.0		94.9
S1	0.92		1.52	36.2		59.8
W	0.41		0.56	16.1		22.0
α		5°			5°	



0102782/D

PPAK mechanical data

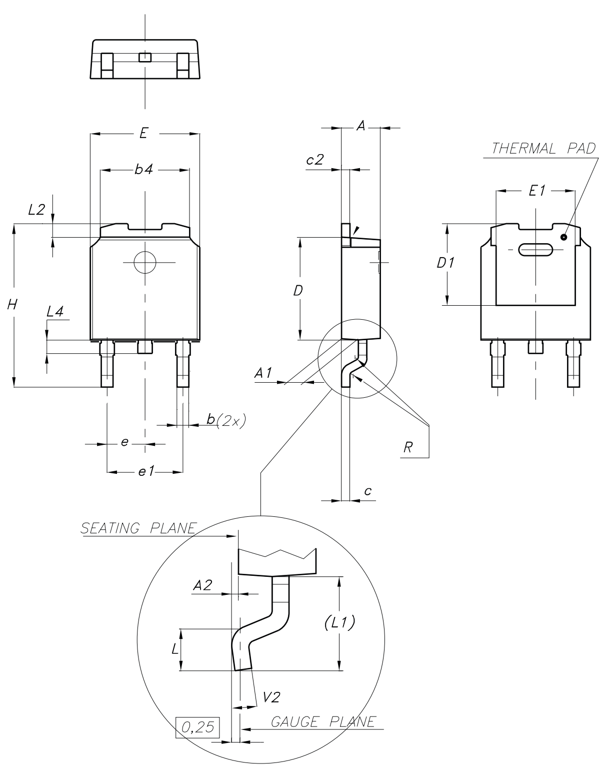
Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.4		0.6	0.015		0.023
B2	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
D1		5.1			0.201	
E	6.4		6.6	0.252		0.260
E1		4.7			0.185	
e		1.27			0.050	
G	4.9		5.25	0.193		0.206
G1	2.38		2.7	0.093		0.106
H	9.35		10.1	0.368		0.397
L2		0.8	1		0.031	0.039
L4	0.6		1	0.023		0.039
L5	1			0.039		
L6		2.8			0.110	



0078180-E

DPAK mechanical data

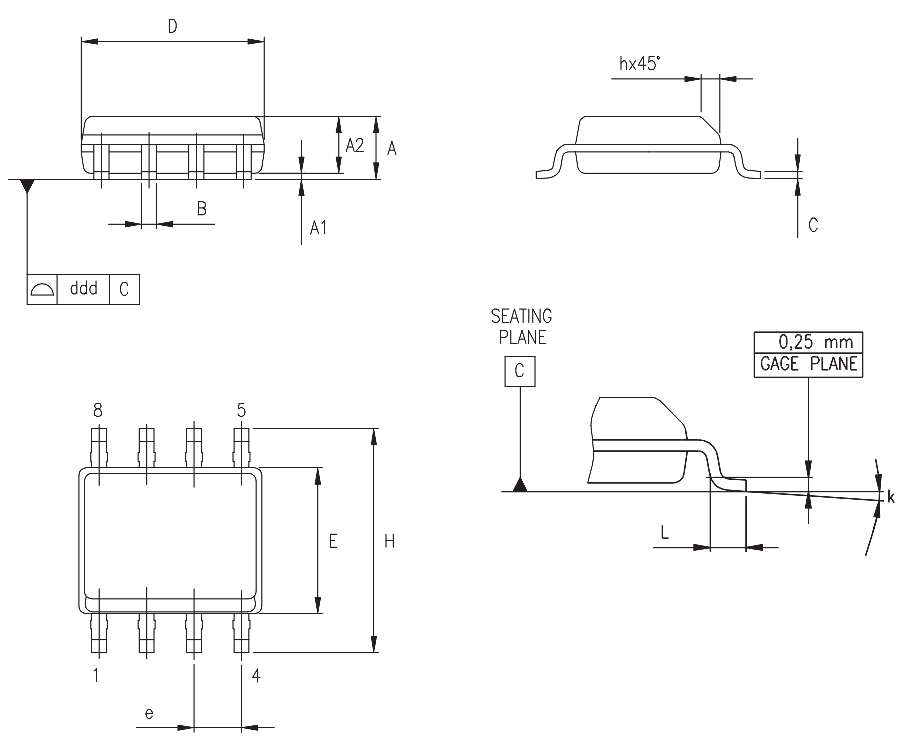
Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
b4	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
D1		5.1			0.200	
E	6.4		6.6	0.252		0.260
E1		4.7			0.185	
e		2.28			0.090	
e1	4.4		4.6	0.173		0.181
H	9.35		10.1	0.368		0.397
L	1			0.039		
(L1)		2.8			0.110	
L2		0.8			0.031	
L4	0.6		1	0.023		0.039
R		0.2			0.008	
V2	0°		8°	0°		8°



0068772-F

SO-8 mechanical data

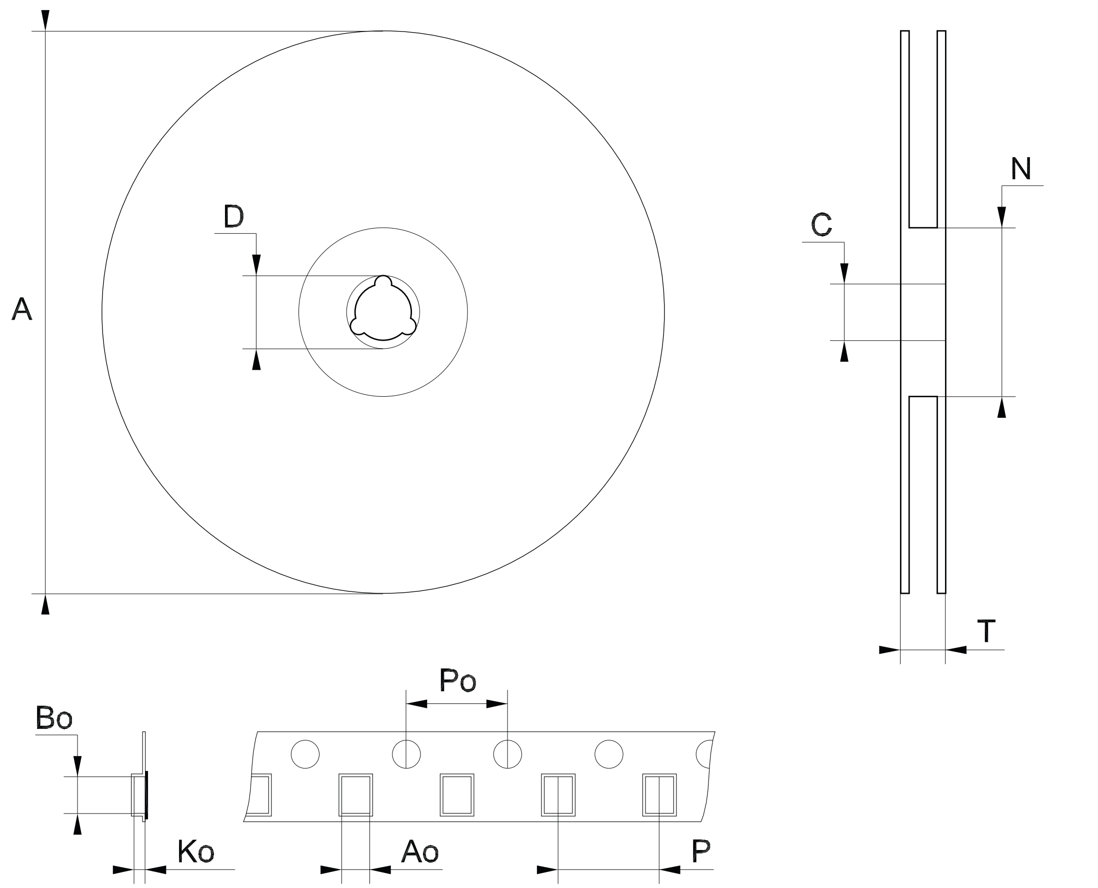
Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.04		0.010
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D	4.80		5.00	0.189		0.197
E	3.80		4.00	0.150		0.157
e		1.27			0.050	
H	5.80		6.20	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
k	8° (max.)					
ddd			0.1			0.04



0016023/C

Tape & reel DPAK-PPAK mechanical data

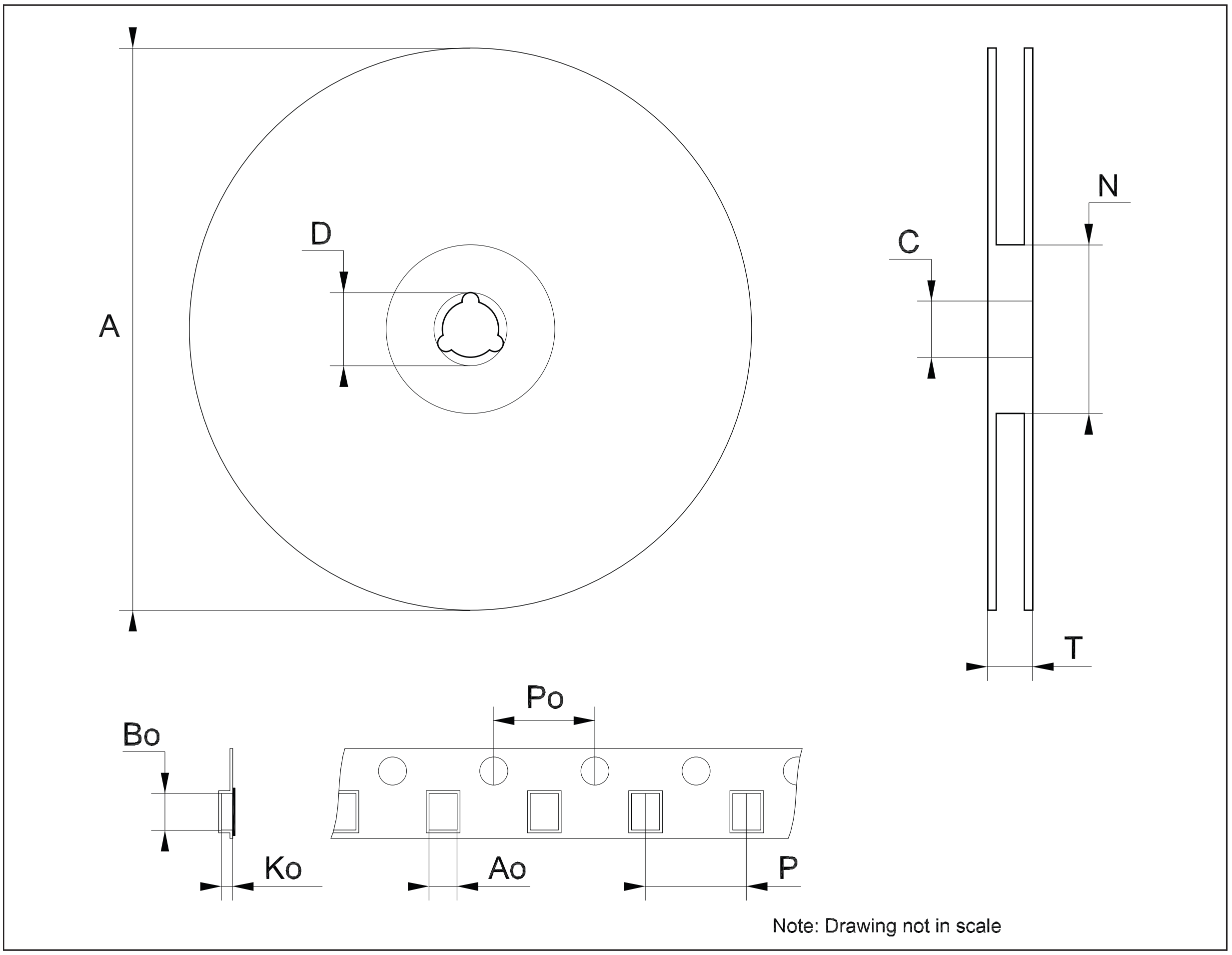
Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			330			12.992
C	12.8	13.0	13.2	0.504	0.512	0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	6.80	6.90	7.00	0.268	0.272	0.2.76
Bo	10.40	10.50	10.60	0.409	0.413	0.417
Ko	2.55	2.65	2.75	0.100	0.104	0.105
Po	3.9	4.0	4.1	0.153	0.157	0.161
P	7.9	8.0	8.1	0.311	0.315	0.319



Note: Drawing not in scale

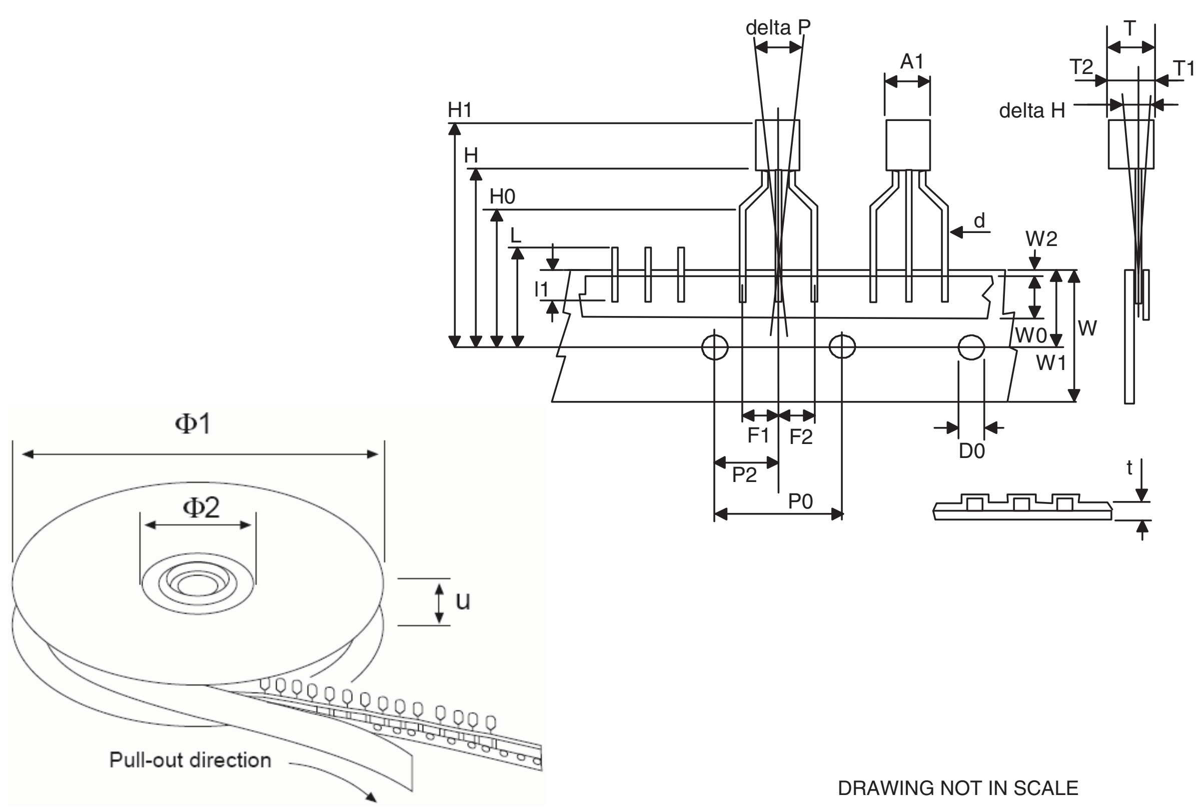
Tape & reel SO-8 mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	8.1		8.5	0.319		0.335
Bo	5.5		5.9	0.216		0.232
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319



Tape & reel for TO-92 mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A1		4.80			0.189	
T		3.80			0.150	
T1		1.60			0.063	
T2		2.30			0.091	
d		0.48			0.019	
P0	12.5		12.9	0.492		0.508
P2	5.65		7.05	0.222		0.278
F1, F2	2.44	2.54	2.94	0.096	0.100	0.116
delta H		±2			0.079	
W	17.5	18.00	19.0	0.689	0.709	0.748
W0	5.7		6.3	0.224		0.248
W1	8.5		9.25	0.335		0.364
W2		0.50			0.20	
H		18.50	18.70		0.728	0.726
H0	15.50		16.50	0.610		0.650
H1		25.00			0.984	
D0	3.8		4.2	0.150		0.165
t		0.90			0.035	
L1		3			0.118	
delta P		±1			0.039	
u		50			1.968	
Φ1		360			14.173	
Φ2		30			1.181	



DRAWING NOT IN SCALE

8 Order codes

Table 19. Order codes

Packages					Output voltage
TO-220	SO-8	PPAK	DPAK	TO-92	
	L4931CD27-TR				2.7 V
	L4931CD27-TRY[(1)]	L4931ABPT27TR			2.7 V
	L4931CD33-TR	L4931CPT33-TR	L4931CDT33-TR	L4931CZ33-AP	3.3 V
L4931ABV33	L4931ABD33-TR		L4931ABDT33-TR		3.3 V
	L4931CD33-TRY[(1)]				3.3 V
	L4931CD35-TR		L4931CDT35-TR		3.5 V
	L4931ABD35-TR		L4931ABDT35TR		3.5 V
	L4931ABD35-TRY[(1)]				3.5 V
	L4931CD50-TR	L4931CPT50-TR	L4931CDT50-TR	L4931CZ50-AP	5 V
	L4931ABD50-TR		L4931ABDT50-TR		5 V
	L4931CD80-TR	L4931CPT80-TR	L4931CDT80-TR		8 V
		L4931ABPT80TR	L4931ABDT80-TR		8 V
	L4931CD120-TR	L4931CPT120-TR	L4931CDT120-TR		12 V
	L4931ABD120TR	L4931ABPT120R			12 V

1. Automotive Grade products.

9 Revision history

Table 20. Document revision history

Date	Revision	Changes
21-Jun-2004	11	Document updating.
14-Jun-2006	12	Order codes updated.
31-Jan-2008	13	Added: *Table 1* and new order codes for Automotive grade products.
20-Feb-2008	14	Modified: *Table 19 on page 34*.
11-Mar-2008	15	Modified: *Table 1 on page 1* and *Table 19 on page 34*.
15-Jul-2008	16	Modified: *Table 1 on page 1* and *Table 19 on page 34*.
18-Aug-2008	17	Modified: *Table 19 on page 34*.

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